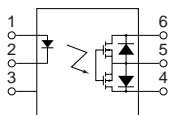


mm inch



### FEATURES

#### 1. Current Limit Function

To control an over current from flowing, the current limit function has been realized. It keeps an output current at a constant value when the current reaches a specified current limit value.

#### 2. Enhancing the capability of surge resistance between output terminals

The current limit function controls the ON time surge current to enhance the capability of surge resistance between output terminals.

#### 3. Reinforced insulation 5,000 V type

More than 0.4 mm internal insulation distance between inputs and outputs. Conforms to EN41003, EN60950 (reinforced insulation).

#### 4. Compact 6-pin DIP size

The device comes in a compact (W)6.4 × (L)8.8 × (H) 3.9mm (W).252 × (L).346 × (H).154inch, 6-pin DIP size

#### 5. Controls low-level analog signals

PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

#### 6. High sensitivity, low ON resistance

#### 7. Low-level off state leakage current

### TYPICAL APPLICATIONS

- Telephone equipment
- Modem

### TYPES

| Type       | I/O isolation voltage | Output rating* |              | Part No.              |                             |            |      | Packing quantity |            |
|------------|-----------------------|----------------|--------------|-----------------------|-----------------------------|------------|------|------------------|------------|
|            |                       |                |              | Through hole terminal | Surface-mount terminal      |            |      |                  |            |
|            |                       | Load voltage   | Load current | Tube packing style    | Tape and reel packing style |            | Tube | Tape and reel    |            |
| AC/DC type | Reinforced 5,000 V    | 350 V          | 130 mA       | AQV210HL              | AQV210HLA                   | AQV210HLAX |      |                  | AQV210HLAZ |

\*Indicate the peak AC and DC values.

Note: For space reasons, the package type indicator "X" and "Z" are omitted from the seal.

### RATING

#### 1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

| Item                    |                         | Symbol    | AQV210HL(A)                     | Remarks                            |
|-------------------------|-------------------------|-----------|---------------------------------|------------------------------------|
| Input                   | LED forward current     | $I_F$     | 50 mA                           |                                    |
|                         | LED reverse voltage     | $V_R$     | 3 V                             |                                    |
|                         | Peak forward current    | $I_{FP}$  | 1 A                             | f = 100 Hz, Duty factor = 0.1%     |
|                         | Power dissipation       | $P_{in}$  | 75 mW                           |                                    |
| Output                  | Load voltage (peak AC)  | $V_L$     | 350 V                           |                                    |
|                         | Continuous load current | $I_L$     | 0.13 A                          |                                    |
|                         | Power dissipation       | $P_{out}$ | 500 mW                          |                                    |
| Total power dissipation |                         | $P_T$     | 550 mW                          |                                    |
| I/O isolation voltage   |                         | $V_{iso}$ | 5,000 V AC                      |                                    |
| Temperature limits      | Operating               | $T_{opr}$ | -40°C to +85°C -40°F to +185°F  | Non-condensing at low temperatures |
|                         | Storage                 | $T_{stg}$ | -40°C to +100°C -40°F to +212°F |                                    |

# AQV210HL

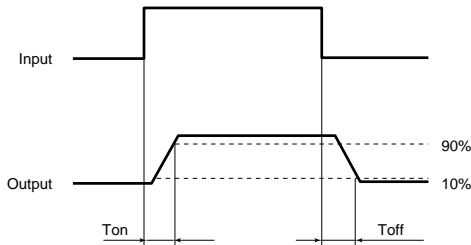
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item                             |                           | Symbol           | AQV210HL(A)                            | Condition  |   |
|----------------------------------|---------------------------|------------------|--|--|---|
| Input                            | LED operate current       | Typical          | 1.6 mA                                 | I <sub>L</sub> = Max.  |   |
|                                  |                           | Maximum          | 3.0 mA                                 |  |   |
|                                  | LED turn off current      | Minimum          | 0.4 mA                                 | I <sub>L</sub> = Max.  |   |
|                                  |                           | Typical          | 1.5 mA                                 |  |   |
| LED dropout voltage              | Minimum                   | V <sub>F</sub>   | 1.14 (1.25 V at I <sub>F</sub> = 50mA) | I <sub>F</sub> = 5 mA  |   |
|                                  | Typical                   |                  | 1.5 V                                  |  |   |
| Output                           | On resistance             | Typical          | 20Ω                                    | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.<br>Within 1 s on time |   |
|                                  |                           | Maximum          | 25Ω                                    |  |   |
|                                  | Off state leakage current | Maximum          | I <sub>Leak</sub>                      | 1μA  | I <sub>F</sub> = 0<br>V <sub>L</sub> = Max. |
| Current limit                    | Typical                   | —                | 180 mA                                 | I <sub>F</sub> = 5 mA  |   |
| Transfer characteristics         | Turn on time*             | Typical          | 0.8 ms                                 | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.                       |   |
|                                  |                           | Maximum          | 2.0 ms                                 |  |   |
|                                  | Turn off time*            | Typical          | 0.05 ms                                | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.                       |   |
|                                  |                           | Maximum          | 1.0 ms                                 |  |   |
|                                  | I/O capacitance           | Typical          | C <sub>iso</sub>                       | 0.8 pF   | f = 1 MHz<br>V <sub>B</sub> = 0             |
|                                  |                           | Maximum          |  | 1.5 pF   |   |
| Initial I/O isolation resistance | Minimum                   | R <sub>iso</sub> | 1,000 MΩ                               | 500 V DC   |   |

Note: Recommendable LED forward current I<sub>F</sub>= 5 to 10 mA.

For type of connection, see Page 31.

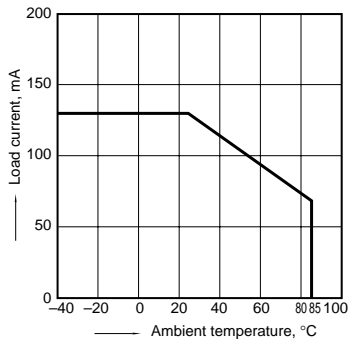
### \*Turn on/Turn off time



## REFERENCE DATA

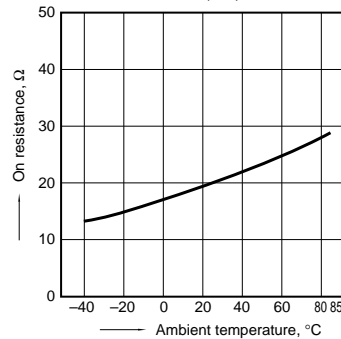
### 1. Load current vs. ambient temperature characteristics

Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F



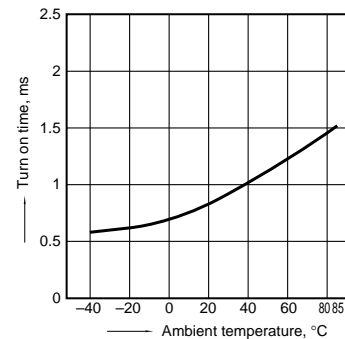
### 2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
LED current: 5 mA; Load voltage: Max. (DC)  
Continuous load current: Max. (DC)



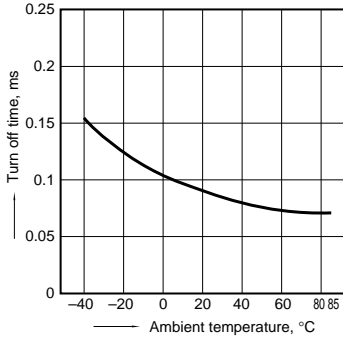
### 3. Turn on time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



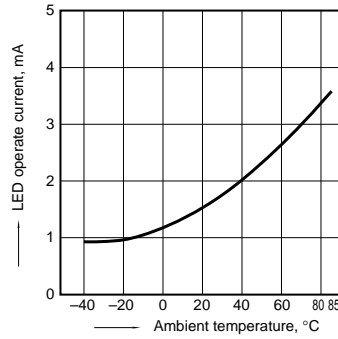
4. Turn off time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: Max.(DC); Continuous load current: Max.(DC)



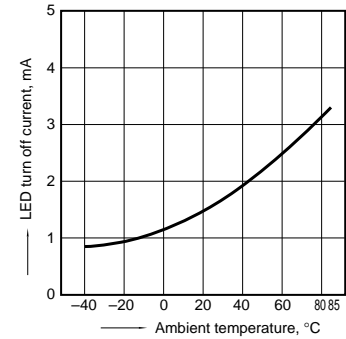
5. LED operate current vs. ambient temperature characteristics

Load voltage: Max.(DC); Continuous load current: Max.(DC)



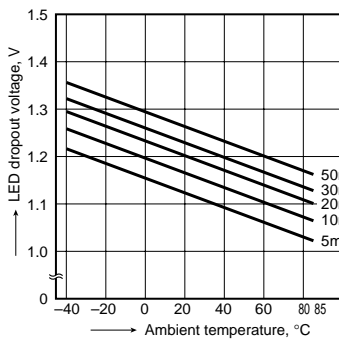
6. LED turn off current vs. ambient temperature characteristics

Load voltage: Max.(DC); Continuous load current: Max.(DC)



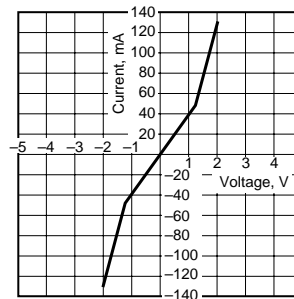
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



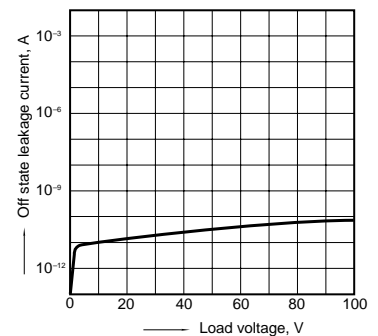
8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 4 and 6; Ambient temperature: 25°C 77°F



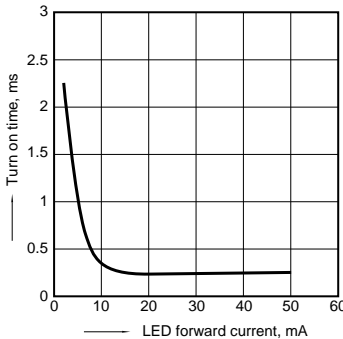
9. Off state leakage current

Measured portion: between terminals 4 and 6; Ambient temperature: 25°C 77°F



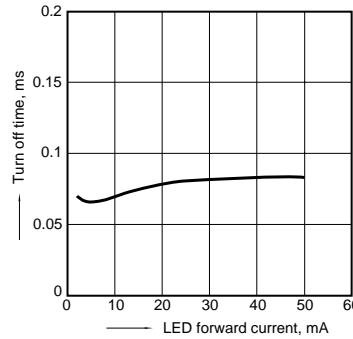
10. LED forward current vs. turn on time characteristics

Measured portion: between terminals 4 and 6; Load voltage: Max.(DC); Continuous load current: Max.(DC); Ambient temperature: 25°C 77°F



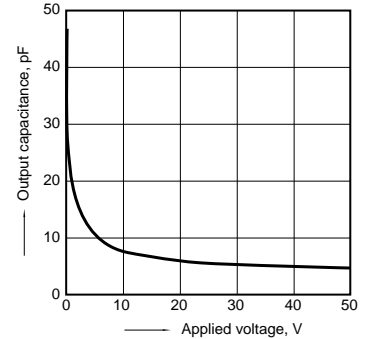
11. LED forward current vs. turn off time characteristics

Measured portion: between terminals 4 and 6; Load voltage: Max.(DC); Continuous load current: Max.(DC); Ambient temperature: 25°C 77°F



12. Applied voltage vs. output capacitance characteristics

Measured portion: between terminals 4 and 6; Frequency: 1 MHz; Ambient temperature: 25°C 77°F



What is current limit

When a load current reaches the specified output control current, a current limit function works against the load current to keep the current a constant value.

The current limit circuit built into the PhotoMOS relay thus controls the instantaneous load current to effectively ensure circuit safety.

This safety feature protects circuits down-

stream of the PhotoMOS relay against over-current.

But, if the current-limiting feature is used longer than the specified time, the PhotoMOS relay can be destroyed. Therefore, set the output loss to the max. rate or less.

- Comparison of output voltage and output current characteristics

V-I Characteristics

